

Applicant: Lipponen et al.
Application No.: 10/559,598
Response to Office action dated Jun. 4, 2008
Response filed August 29, 2008

Claim Listing

1–70. (canceled)

71. (previously presented) A paper or board web surface sizing apparatus comprising:

- a paper or board web having a first side and a second side, and pores leading from the first side and the second side into inner layers of the web, the web following a path through the apparatus defining a running direction;
- a turning roll which engages the web to cause the web path to follow a curve, the web having a first side facing away from the turning roll and a second side which engages the roll;
- a first vacuum nozzle arranged to suck air from the web after the turning roll to form an vacuum in pores in the web; and
- an applicator for applying surface size to the web first side, the applicator being positioned after the vacuum nozzle.

72. (previously presented) The apparatus of claim 71 further comprising a trough disposed at the curve and arranged to guide a main part of an air flow traveling with the web, away from the web first side.

73. (previously presented) The apparatus of claim 72 wherein the first vacuum nozzle is arranged to suck air from the first side of the web after the trough.

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74. (previously presented) The apparatus of claim 73 further comprising a second vacuum nozzle arranged after the turning roll on the second side of the web, the second vacuum nozzle directed to cause vacuum in the pores of the web.

75. (previously presented) The apparatus of claim 74 further comprising a first overpressure nozzle positioned after the applicator and arranged to put pressure on the first side of the web and a second overpressure nozzle arranged to arranged to put pressure on the second side of the web after the applicator.

76. (new) A method of applying surface size to a paper web comprising the steps of:
guiding a paper web past a spray coater and spraying a size solution onto a first side of the web; and
following spraying the size solution onto the first side, guiding the paper web around a vacuum roll and applying to a second side opposite the first side a vacuum of between 5 kPa and 80 kPa.

77. (new) The method of claim 76 further comprising drying the first side of the paper web with an infrared or impingement dryer over the suction zone of the suction roll.

78. (new) The method of claim 76 further comprising the steps of:
guiding the paper web through a non-contact dryer after guiding the paper web around the vacuum roll;
guiding the paper web past a second spray coater and spraying a size solution onto the second side of the web; and
following spraying the size solution onto the second side, guiding the paper web around a second vacuum roll and applying to the first side, opposite the second side, a vacuum of between 5 kPa and 80 kPa.

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79. (new) A method of applying surface size to a paper web comprising the steps of:
guiding a paper web past a spray coater and spraying a size solution onto a first side of the web; and
simultaneously while spraying the size solution onto the first side, guiding the paper web around a vacuum roll and applying to a second side opposite the first side a vacuum of between 5 kPa and 80 kPa before, during, and after spraying the size solution onto the first side of the web.

80. (new) A method of applying surface size to a paper web comprising the steps of:
passing a paper web over a first guide roll overlain by a wire, followed by passing the paper web underlain by the wire over a first vacuum box;
thereafter passing the paper web underlain by the wire over a first vacuum roll or shoe;
thereafter passing the paper web underlain by the wire over a second vacuum box;
thereafter passing the paper web overlain by the wire over a second guide roll,
wherein surface size is applied to the paper web on a first side opposite the wire at one or more locations selected from the group comprising: before the first guide roll, where the web first engages the first guide roll, over the first vacuum box, and over the first vacuum roll; and
wherein the surface size is drawn into the paper web by the vacuum applied through the wire to the paper web by the first vacuum box, the first vacuum roll, and the second vacuum box.

81. (new) The method of claim 80 further comprising drying the first side of the paper web with an infrared or impingement dryer between the first vacuum roll and the second guide roll.

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82. (new) A method of applying surface size to a paper web comprising the steps of:

drying the paper web on a first dryer cylinder overlain by a wire, followed by;
passing the paper web over a suction roll underlain by the wire, followed by;
passing the paper web underlain by the wire over a first vacuum box, followed by;
passing the paper web overlain by the wire around a first guide roll and between a curved suction box and said first guide roll, followed by;
passing the paper web underlain by the wire over a second vacuum box, followed by;
passing the paper web underlain by the wire over a second vacuum roll, followed by;
drying the paper web on a second dryer cylinder overlain by the wire; and
applying surface size to the paper web on a first side opposite the wire at a location between the first vacuum box and the first guide roll so that the surface size is drawn in to the paper web.

83. (new) The method of claim 82 further comprising drying the paper web with an infrared or impingement dryer over at the second suction roll.

84. (new) A method of applying surface size to a paper web comprising the steps of:

passing the paper web over a first guide roll underlain by the wire followed by;
passing the paper web overlain by the wire around a second guide roll and between a curved suction box and said first guide roll, followed by;
applying surface size to the paper web on a first side opposite the wire at a location between the first guide roll and the second guide roll so that the surface size is drawn into the paper web; and
after the paper web leaves the second guide roll passing the web to further treatment by a contact-free air turning device.